

1.0 PURPOSE

The purpose of the Engineering Design Guidelines manual is to provide criteria requirements, instructions, and guidance to the program staff and the contracted consultant teams through design, review, and general support of the various projects of the FasTracks program.

2.0 NEED

The need for this manual is to consistify (to provide uniformity in) the design, review, and support efforts provided throughout the FasTracks program so that the end result is a quality system.

3.0 RESPONSIBLE STAFF

3.1 RTD FasTracks Program Staff

A. Engineering Technical Support (ETS) Staff

The ETS staff acts as a support function for the Regional Transportation District (RTD) projects. The ETS staff will review products from contracted design consultants to ensure quality designs that meet project criteria. The ETS staff will also be tasked to prepare quality project designs in-house. The ETS staff represents RTDs technical expertise in the following areas:

- Architectural
- Civil (Grading, Roadway, Traffic)
- Drainage (Retention, Detention, Water Quality, Erosion Control)
- Environmental
- Landscape Architecture
- Stations & park-n-Rides
- Structural
- Systems / Electrical / Mechanical
- Trackwork
- Utilities

B. Other, non-ETS Staff

The other, non-ETS, staff will review designs as appropriate to the relevancy of each design. The non-ETS staff provides expertise in the following areas:

- Maintenance of Way
- Facilities Maintenance
- Operations
- Safety
- Service Planning

C. **Engineering Project Management Staff**

The project managers and assistant managers manage the individual FasTracks projects. The management staff reviews recommendations from the ETS staff and makes decisions on project implementation.

D. **Document Control Staff**

The document control staff includes those individuals who maintain the RTD library that records all baseline and non-baseline documents, drawings, letters, emails, etc.

3.2 Contracted Consultant Teams

A. **Contracted Consultant Design Team**

Separate contracts will be awarded for each project, thus the consultant team shall differ from project to project. The team selected shall provide the required expertise for each discipline, as required by the contract scope of work, and may consist of staff from the many sub-consultant companies. The design team shall perform quality designs that meet project criteria.

B. **SUE On-Call Contractors**

The subsurface utility engineering contractors will assist the RTD ETS staff by being available to perform utility locates for RTD on an as-needed basis.

4.0 FASTTRACKS PROJECTS

The FasTracks program includes several separate projects. Although the ETS staff may support work on other projects, the following list provides the primary concern of the ETS staff and this manual:

- 40th and 40th Extension Corridor
- East Corridor
- Gold Line Corridor
- I-225 Corridor
- North Metro Corridor
- Southeast Corridor Extension
- Southwest Corridor Extension
- Northwest Rail Corridor
- US-36 Bus Rapid Transit Corridor
- West Corridor
- Denver Union Station
- Bus Maintenance Facility
- Commuter Rail Maintenance Facility
- Light Rail Maintenance Facility

5.0 GENERAL INFORMATION ABOUT THE PROCEDURE REQUIREMENTS

- A. The FasTracks program may consist of Design-Bid-Build (DBB), Design-Build (DB), Construction Manager / General Contractor (CM/GC), and Public Private Partnership (PPP) projects. These procedures apply to all FasTracks projects, regardless of the type of project.
- B. These procedures have been written based on the standard Basic Engineering (BE) / Draft Environmental Impact Study (DEIS), 50%, 65%, 90%, 100% design phases. For any FasTracks project that deviates from this standard, RTD will base all requirements on the next highest standard design phase (for example: a 30% design shall be evaluated to the 50% design requirements).

6.0 PROCEDURES LIST

PROCEDURE #	PROCEDURE TITLE	INTERNAL / EXTERNAL
EDG - 0	Purpose & Need - Introduction	Both
EDG - 1	Existing Field Conditions	Both
EDG - 2	Subsurface Utility Engineering	Internal
EDG - 3	Scheduling	Internal
EDG - 4	Project Design Procedures	Both
EDG - 5	Design Calculations	Both
EDG - 6	Specifications	Both
EDG - 7	Variance to RTD Criteria	Both
EDG - 8	Cost Development & Estimating	Both
EDG - 9	Engineering Review Checklists	Internal
EDG - 10	Engineering Design Review	Internal
EDG - 11	Quality Plan	Internal
EDG - 12	Value Engineering	Both
EDG - 13	Revisions to EDG Procedures	Internal

7.0 REFERENCES & PUBLICATIONS

The following is a list of required and recommended resources that will help guide the design process. It is the designer's responsibility to determine what references, publications, and other materials are required for each specific design and to acquire and use them as needed to design a successful project. This list is not intended to be all inclusive.

A. Regional Transportation District (RTD) PUBLICATIONS

- RTD Light Rail Design Criteria
- RTD Commuter Rail Design Criteria
- RTD Bus Transit Facility Design Guidelines and Criteria
- RTD Standard Plans for Bus and Light Rail Transit Facilities
- RTD Grade Separation Methodology

B. Colorado Department of Transportation (CDOT) PUBLICATIONS

- CDOT Bridge Design Manual
- CDOT Bridge Detailing Manual
- CDOT Bridge Rating Manual
- Staff Bridge Technical Memorandums
- Staff Bridge Project Special Provisions
- CDOT Staff Bridge Worksheets (Standard Drawings)
- CDOT Standard Specifications for Road and Bridge Construction
- CDOT Supplemental Standard Specifications for Construction
- CDOT Standard Special Provisions
- CDOT Standard Plans – M&S Standards
- CDOT Design Manual
- CDOT Construction Manual
- CDOT Right of Way Manual
- CDOT Utility Manual

C. American Association of State Highway & Transportation Officials (AASHTO) PUBLICATIONS

- AASHTO LRFD Bridge Design Specifications
- AASHTO Standard Specifications for Highway Bridges
- AASHTO Guide Specifications for the Design of Pedestrian Bridges
- AASHTO Guide Specifications for Horizontally Curved Highway Bridges
- AASHTO Manual for Condition Evaluation of Bridges
- AASHTO Guide Specifications for Design and Construction of Segmental Concrete Bridges
- AASHTO Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals
- AASHTO Guide Specifications for Structural Design of Sound Barriers
- AASHTO Guide for Accommodating Utilities Within Highway Right-of-Way

- AASHTO A Policy on Geometric Design of Highways and Streets
- D. American Railway Engineering & Maintenance of Way Association (AREMA) PUBLICATIONS
 - Manual for Railway Engineering, (all Volumes)
 - Practical Guide to Railway Engineering
 - Portfolio of Trackwork Plans
- E. AMTRAK
 - MW 1000
- F. UNION PACIFIC RAILROAD (UPRR) PUBLICATIONS
 - Guidelines for Design and Construction of Grade Separation Underpass Structures
 - Track Standards
- G. BURLINGTON NORTHERN SANTA FE RAILROAD (BNSF) PUBLICATIONS
 - Guidelines for Design and Construction of Grade Separation Structures
 - Standard Plans - Trackwork
- H. TRANSPORTATION RESEARCH BOARD (TRB) PUBLICATIONS
 - Transit Cooperative Research Program (TCRP) Report 57 Track Design Handbook for Light Rail Transit
- I. FEDERAL HIGHWAY ADMINISTRATION (FHWA) PUBLICATIONS
 - Railroad/Highway Grade Separation Handbook
 - MUTCD
 - Utility Relocation and Accommodation on Federal-Aid Highway Projects
- J. FEDERAL RAILROAD ADMINISTRATION (FRA) PUBLICATIONS
 - GradeDec 2000 System for Grade Crossing Investment Analysis
- K. COLORADO DEPARTMENT OF REGULATORY AGENCIES (DORA) PUBLICATIONS
 - Public Utilities Commission publications
- L. CODE OF FEDERAL REGULATIONS (CFR) PUBLICATIONS
 - 23CFR645 – Utilities
 - 23CFR646 - Railroads
- M. WEBSITES
 - www.fta.gov
 - www.dot.state.co.us
 - www.uncc.org

8.0 ATTACHMENTS

None

9.0 APPROVAL

Revision Level:	Approved By:	Signature	Date
Major Revision	John Shonsey, Senior Manager Engineering		10-16-07
Minor Revision	Henry Stoppelcamp, Engineering Technical Services Manager		10-16-7

10.0 REVISION RECORD

Revision Level	Revision Date	Summary	Approval Date
0	10/12/08	Initial Baseline Issue	